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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/802,366	03/16/2004	Paul F. Dietrich	6561/53799	3793

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EXAMINER

DAGOSTA, STEPHEN M

ART UNIT	PAPER NUMBER
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2683

DATE MAILED: 12/20/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/802,366

Applicant(s)

DIETRICH ET AL.

Examiner

Stephen M. D'Agosta

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-46 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-13, 15-27 and 29-46 is/are rejected.
- 7) ☒ Claim(s) 14 and 28 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Information Disclosure Statement

The information disclosure statement filed 3-16-2004 fails to comply with the provisions of 37 CFR 1.97, 1.98 and MPEP § 609 because there is no publication date listed for the document. It has been placed in the application file, but the information referred to therein has not been considered as to the merits. Applicant is advised that the date of any re-submission of any item of information contained in this information disclosure statement or the submission of any missing element(s) will be the date of submission for purposes of determining compliance with the requirements based on the time of filing the statement, including all certification requirements for statements under 37 CFR 1.97(e). See MPEP § 609.05(a).

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-2, 4, 6-12, 16, 19, 21-27,, 29-36, 38, 40-46 rejected under 35 U.S.C. 102(e) as being anticipated by Bahl et al. US 6,799,047.

As per **claims 1, 16, 27 and 34**, Bahl teaches a method for estimating the location of a wireless node relative to a plurality of radio receivers operative to detect the strength of RF signals (title, abstract), wherein a RF coverage map, corresponding to each of the radio receivers, characterizes the signal strength values for locations in a physical region (figures 2-5 and figure 6, #160 is a table/map of coverage area), comprising;

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collecting signal strength values, detected at a plurality of radio receivers, corresponding to signals transmitted by a wireless node (C2, L8-28 teaches the mobile measuring signals but the Abstract teaches either the mobile or BTS's can measure);

computing the estimated location of the wireless node based on the collected signal strength values and the RF coverage maps corresponding to the plurality of radio receivers (C5, L28 to C6, L65 teaches taking empirical measurements and storing them in a table/coverage map so that a roaming mobile can determine it's location based on matching it's current reading to the stored data),

wherein the contribution of each detected signal strength value to the estimated location is weighted according to a weighting function that varies with the signal strength values detected by the radio receivers (C7, L63 to C8, L18 teaches using weighting factors, as is well known in the art).

With further regard to claim 16, Bahl teaches mobile device(s) and BTS's which inherently comprise an antenna.

With further regard to claim 27, Bahl teaches using at least two BTS's (three are actually shown) which can measure signal strength transmitted from a test device to store empirical data used by mobiles to determine their location, which reads on a unique pair of radio receivers.

As per **claims 2, 17 and 36**, Bahl teaches claim 1/16 wherein the computing step comprises computing, for each radio receiver, an individual error surface based on the RF coverage map associated with the radio receiver and the signal strength detected by the radio receiver; weighting each of the individual error surfaces according to a weighting function that varies with the signal strength detected by corresponding radio receivers; aggregating the individual error surfaces to create a total error surface; finding the location of the minimum of the total error surface C6, L52 to C7, L63 teaches determining location based on the differences between previously measured/stored data vs. the roaming mobile's current measurements. Differences between the two are used to calculate a location).

As per **claims 4, 19 and 38**, Bahl teaches claim 1/17/35 wherein the weighting function expresses the confidence in the individual error surface location relative to the distance error caused by potential errors associated with the signal strength detected by a radio receiver (C7, L63 to C8, L19 teaches using "weighting" which is interpreted as a "confidence factor" since a higher weight means the data is more "trusted/anticipated" than a lower weight).

As per **claims 6, 21 and 40**, Bahl teaches claim 1/16/35 wherein the weighting function is based in part on the distance error caused by a change in the signal strength detected by a radio receiver (C7, L63 to C8, L65 teaches using weighting if/when the signal strength values detected are not as stored in the database due to the user not being in the same exact location/distance as when the empirical database values were measured, which reads on a change, eg. **1dB** or more, caused by a distance/orientation error. Also see C7, L65 to C8, L12).

As per **claims 7, 22 and 46**, Bahl teaches claim 1/16/35 further comprising detecting, at a plurality of radio transceivers, the strength of signals transmitted by a wireless node (abstract teaches either the mobile and/or BTS detecting signal strengths).

As per **claims 8, 30 and 41**, Bahl teaches claim 1/27/35 wherein the RF coverage maps each comprise a plurality of location coordinates associated with corresponding signal strength values (C5, L64 to C6, L56 teaches a "Location", see table 1, which is a reference point used to take empirical measurements and would have coordinates associated with it, eg. either a room, GPS or LAT/LONG coordinate).

As per **claims 9, 23, 31 and 42**, Bahl teaches 9/22/30/41 The method of claim 8 wherein the RF coverage maps are heuristically constructed (abstract teaches taking measurements from a mobile computer at known locations to build a table/map).

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As per **claims 10, 24, 32 and 43**, Bahl teaches claim 8/22/30/41 wherein the RF coverage maps are based on a mathematical model (figure 5 shows a mathematical approach, see C10, L61 to C12, L14 where C11, L62 teaches mathematical estimation).

As per **claims 11-12, 25-26, 33-34 and 44-45**, Bahl teaches claim 1/16 wherein the signals transmitted by the wireless nodes are formatted according to a wireless communications protocol/IEEE 802.11 protocol (C2, L3-10 teaches WLAN).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 3, 18 and 37 rejected under 35 U.S.C. 103(a) as being unpatentable over Bahl and further in view of Stilp et al. US 5,327,144.

As per **claims 3, 18 and 37**, Bahl teaches claim 2/18/36 **but is silent on** wherein each individual error surface comprises the sum of the squares of the difference between the signal strength values detected by a radio receiver and the signal strength values in a corresponding RF coverage map.

Stilp teaches The TDOA data may be used to estimate the latitude and longitude of the cellular telephone by calculating that latitude and longitude for which the sum of the squares of the difference between the observed TDOA and the TDOA calculated on the basis of the cell site geometry and the assumed cellular telephone location is an absolute minimum, where the search of

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trial latitudes and longitudes extends over the entire service area of the system. (C14, L15-40)

It would have been obvious to one skilled in the art at the time of the invention to modify Bahl, such that each individual error surface comprises the sum of the squares of the difference between the signal strength values detected by a radio receiver and the signal strength values in a corresponding RF coverage map, to provide means for using well known mathematical formulas to reduce the effects of positive/negative differences (eg. is absolute).

Claims 5, 15, 20 and 39 rejected under 35 U.S.C. 103(a) as being unpatentable over Bahl and further in view of Kovach et al. US 6,317,604.

As per **claims 5, 20 and 39**, Bahl teaches claim 1/16/35 **but is silent on** wherein the weighting function is configured such that contributions associated with detected signal strengths above a predetermined threshold value are equally weighted.

The examiner notes that weighting is a well known technique for giving specific data values either more (or less) importance than others. Hence, one skilled realizes that weighting can either be more, less or equal. Bahl uses weighting factors which can broadly be interpreted as either more, less or equal depending upon where the user is located and how the measurements track to the stored database values.

In a similar approach, Kovach teaches not using measurements below threshold values:

In general, the weights, or quality factors are based on similar criteria to that discussed above for the threshold criteria in including baselines. That is, the results of the criteria calculations are used for weights and when the criteria falls below threshold the weight is then set to zero and is effectively not included in the determination of the final location solution. (C56, L33-44)

It would have been obvious to one skilled in the art at the time of the invention to modify Bahl, such that the weighting function is configured such that contributions

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associated with detected signal strengths above a predetermined threshold value are equally weighted, to provide means for using any/all signals received above a certain threshold in the location calculation while not using.

As per **claim 15**, Bahl teaches claim 1 **but is silent on** wherein only signal strength values above a threshold signal strength value are used to compute the estimated location of the wireless node.

Kovach teaches not using measurements below threshold values:

The LSD' form of the equation offers an easier means of removing a bias in location solutions at the reference site by making $w_{sub.0}$ equal to the maximum value of the other weights or basing $w_{sub.0}$ on the relative signal strength at the reference site. Note that if $w_{sub.0}$ is much larger than the other weights, then b is approximately equal to $\tau_{sub.0}$. In general, the weights, or quality factors are based on similar criteria to that discussed above for the threshold criteria in including baselines. That is, the results of the criteria calculations are used for weights and when the criteria falls below threshold the weight is then set to zero and is effectively not included in the determination of the final location solution. (C56, L33-44)''

It would have been obvious to one skilled in the art at the time of the invention to modify Bahl, such that only signal strength values above a threshold signal strength value are used to compute the estimated location of the wireless node, to provide means for only using those signals which are deemed as "optimal" for use in the location determination calculation.

Claim 13 rejected under 35 U.S.C. 103(a) as being unpatentable over Bahl.

As per **claim 13** Bahl teaches claim 1 **but is silent on** wherein at least one of the collected signals is transmitted by the wireless node in a first frequency band, and

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wherein at least one other of the collected signals is transmitted by the wireless node in a second frequency band.

The examiner takes **Official Notice** that dual-mode mobile units are well known in the art and a dual-mode transmitter would receive/collect data in two different frequency bands for location measurements.

It would have been obvious to one skilled in the art at the time of the invention to modify Bahl, such that at least one of the collected signals is transmitted by the wireless node in a first frequency band, and wherein at least one other of the collected signals is transmitted by the wireless node in a second frequency band, to provide means for receiving measurements from multiple proximate wireless networks.

Allowable Subject Matter

Claims 14 and 28 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim 14: The prior art of record does not disclose, alone or in combination, means for “the weighing function weights the signal strength values associated with the first frequency band higher than the signal strength values associated with the second frequency band”.

Claim 28: The prior art of record does not disclose, alone or in combination, means for “computing for all unique pairs of radio receivers, the sum of the squares of the difference between the signal strength values detected by a pair of radio receivers less the difference between the signal strength values in the RF coverage maps associated with the pair of radio receivers; weighting each of the computed sums based on the lower of the two signal strength values detected by the corresponding pair of radio receivers; combining the weighted sums to create a differential error surface; and finding the minimum of the differential error surface”.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

1. LeBlanc et al. US 6,236,365
2. Smith US 6,1678,274
3. Sugiura et al. US 6,140,964
4. MacDonald US 5,732,354
5. Shibuya US 5,666,662
6. Chia US 5,394,158

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen M. D'Agosta whose telephone number is 571-272-7862. The examiner can normally be reached on M-F, 8am to 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bill Trost can be reached on 571-272-7872. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Stephen D'Agosta
Primary Examiner

